

ART 34 AMDT

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1) A projectile deployment system for use in a target intercepting device, the projectile deployment system including:

- a) A body defining a body axis;
- 5 b) A barrel array formed from a number of barrels circumferentially spaced around the body axis, each barrel being arranged at a predetermined angle with respect to the body axis;
- c) A number of projectiles axially stacked along each barrel;
- d) A number of charges, each charge being associated with a respective projectile to urge 10 the respective projectile along the barrel upon activation to thereby deploy the projectile.

2) A projectile deployment system according to claim 1, wherein:

- a) The body includes a support body defining the number of barrels, the barrels being adapted to receive the projectiles and associated charges at predetermined positions; and,
- 15 b) The body including a number of connectors extending therethrough for connecting first and second connections provided on each projectile to a controller.

3) A projectile deployment system according to claim 2, the controller being housed in a cavity in the support body.

20 4) A projectile deployment system according to claim 2 or claim 3, the first and second connections of each projectile being coupled to an ignition means for activating the charge associated with the respective projectile.

5) A projectile deployment system according to any one of the claims 2 to 4, the connectors including:

- 25 a) A number of sets of first connectors, each set of first connectors coupling the first connections of each of the projectiles in a respective set of barrels to the controller; and,
- b) A number of second connectors, each second connector coupling the second connections of selected projectiles in different sets of barrels to the controller, thereby

30 allowing the controller to apply activation signals to selected ones of the sets of first connectors and the second connectors to thereby deploy selected projectiles.

6) A projectile deployment system according to claim 1, the body including a support member having a number of barrels mounted thereon.

7) A projectile deployment system according to claim 6, wherein :

- a) Each projectile is associated with ignition means for activating the charge associated with the respective projectile;
- b) Each barrel is provided with respective barrel connectors for connecting to the ignition means, the connectors extending along the barrel to a breach end; and,

5 c) A number of connectors provided in the support member, the connectors being adapted to cooperate with the barrel connectors to thereby couple the ignition means to a controller.

8) A projectile deployment system according to claim 7, the support member including a cavity for receiving the controller.

10 9) A projectile deployment system according to any one of the claims 1 to 8, the projectile deployment system including a controller for deploying the projectiles by:

- a) Activating the charge associated with the projectile positioned nearest to a muzzle end of one or more selected barrels;
- b) Repeating step (a) to thereby fire the projectiles sequentially from the barrel.

15 10) A projectile deployment system according to claim 9, the controller being adapted to selectively activate the charges to thereby deploy the projectiles in accordance with a projectile deployment pattern.

11) A projectile deployment system according to claim 10, the controller activating the charges by applying a predetermined activation pulse thereto.

20 12) A projectile deployment system according to claim 11, the projectile deployment system including one or more firing circuits for generating the activation pulses.

13) A projectile deployment system according to claim 10 or claim 11, the controller being adapted to fire the charges at predetermined time intervals to thereby control the rate of deployment of the projectiles.

25 14) A projectile deployment system according to any one of the claims 1 to 13, the controller including:

- a) A store for storing pattern data representing one or more predetermined projectile deployment patterns; and,
- b) A processor adapted to:
 - i) Determine the position of the target with respect to the projectile deployment system;
 - ii) Select a projectile deployment pattern in accordance with position of the target; and,

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iii) Selectively activate the charges in accordance with the pattern data.

15) A projectile deployment system according to claim 14, the projectile deployment system including one or more sensors for sensing the target, the processor being adapted to monitor the sensors to thereby determine the position of the target with respect to the projectile deployment system.

16) A projectile deployment system according to claim 15, the controller being coupled to a remote sensing system via a communications system, the remote sensing system being adapted to;

10 a) Determine the position of the target with respect to the projectile deployment system; and,

b) Transfer an indication of the target position to the controller via the communications system.

17) A projectile deployment system according to any one of the claims 14 to 16, the pattern data indicating at least one of:

15 a) The barrels from which projectiles should be fired; and,

b) The rate of deployment of the projectiles.

18) A projectile deployment system according to any one of the claims 1 to 17, at least some of the barrels extending radially outwardly from the body axis.

19) A projectile deployment system according to claim 18, the projectile deployment 20 system including at least one planar barrel array, the planar barrel array including a number of barrels extending radially outwardly from the body axis so as to define a plane perpendicular to the body axis.

20) A projectile deployment system according to claim 19, the projectile deployment system including a number of planar barrel arrays spaced apart along the body axis.

25) 21) A projectile deployment system according to claim 20, at least some of the planar barrel arrays being skewed with respect to each other such that at least one of the planar barrel arrays deploys projectiles in a direction different to at least one other planar barrel array.

22) A projectile deployment system according to claim 21, the barrels of adjacent barrel 30 arrays being partially interleaved.

23) A projectile deployment system according to any one of the claims 20 to 22, one or more of the planar barrel arrays being rotatably mounted to the body to thereby rotate about the body axis.

24) A projectile deployment system according to any one of the claims 1 to 18, at least some of the barrels extending in a direction parallel to the body axis.

5 25) A projectile deployment system according to claim 24, at least some of the barrels defining a barrel array for deploying projectiles in directions along and outwardly from the body axis.

10 26) A projectile deployment system according to any one of the claims 1 to 25, the projectile target intercepting device being a kill vehicle, the kill vehicle including;

- a) A propellant system for propelling the kill vehicle; and,
- b) A flight controller, the flight controller being adapted to control the propellant system to thereby control the kill vehicle trajectory.

27) A projectile deployment system according to claim 26, the propellant system being adapted to be propelled in a direction substantially parallel to the body axis.

28) A projectile deployment system according to any one of the claims 1 to 25, the projectile target intercepting device being a missile.

15 29) A method of manufacturing a projectile deployment system, the method including:

- a) Providing a body member defining a body axis;
- b) Providing a support material surrounding the body member, the support material including a number of first and second connectors embedded therein;
- c) Drilling a number of holes in the support material to thereby define one or more barrels, the barrels being circumferentially spaced around the body axis and being adapted to intersect selected ones of the first and second sets of connectors; and,
- d) Inserting projectiles and associated charges into the barrels, the projectiles including first and second connections, the projectiles being aligned such that:
- i) The first connections of each of the projectiles in a respective set of barrels are coupled to a respective set of first connectors; and,
- 25 ii) The second connections of respective projectiles in different sets of barrels are coupled to respective second connections.

30) A method according to claim 29, the method including:

- a) Mounting a control system within a cavity in the body member; and,
- b) Coupling the control system to the sets of first connectors and the second connectors.

31) A method according to claim 29 or claim 30, the method including manufacturing a projectile deployment system according to any one of the claims 1 to 28.

32) A method of manufacturing a projectile deployment system, the method including:

- Providing a body member defining a body axis;
- Coupling a barrel array having a number of barrels to the body member, the barrels being circumferentially spaced around the support axis, and each barrel being arranged at a predetermined angle with respect to the body axis; the barrels including a number of connectors;
- Inserting projectiles and associated charges into the barrels, the projectiles including first and second connections adapted to be aligned with respective ones of the number of connectors; and,
- Mounting a control system in a cavity in the barrel array, the control system being coupled to the connectors to allow the projectiles to be deployed.

33) A method according to claim 32, the method including manufacturing a projectile deployment system according to any one of the claims 1 to 28.

34) Apparatus for intercepting a target, the apparatus including:

- A projectile deployment system having:
 - A body; and,
 - A number of projectile systems mounted to the body in an array, each projectile system being adapted to deploy a number of projectiles in a predetermined direction with respect to the body and, including:
 - a barrel
 - a number of projectiles
 - a number of charges, each charge being adapted to urge a respective projectile along the barrel to thereby deploy the projectile;
- A controller, the controller being adapted to selectively activate one or more of the projectile systems to thereby deploy projectiles in accordance with a projectile deployment pattern.

35) Apparatus according to claim 34, the apparatus including:

- A vehicle having a vehicle body defining a vehicle axis;
- A propellant system for propelling the vehicle; and,
- A flight controller, the flight controller being adapted to control the propellant system to thereby control the vehicle trajectory.

36) Apparatus according to claim 34 or claim 35, the apparatus including a projectile deployment system according to any one of the claims 1 to 28.

37) Apparatus according to claim 36, the projectile deployment system being aligned such that the vehicle axis is substantially coaxial with the body axis.

38) Apparatus according to claim 36 or claim 37, the deployment of each projectile causing a reactive force along the respective barrel, the pattern of projectiles being at least one of:

- a) Symmetric around the body axis to thereby equalise the reactive forces on the body; and,
- b) Non-symmetric around the body axis to thereby generate non-symmetric reactive forces, thereby causing deflection of the body.

5 39) Apparatus according to claim 38, the firing pattern of the projectiles being adapted to control the trajectory of the vehicle.

40) Apparatus according to any one of the claims 34 to 39, the target being a missile.

41) Apparatus according to any one of the claims 34 to 40, the projectile deployment pattern being selected to thereby increase the effective cross sectional area of the vehicle.

10 42) Apparatus according to any one of the claims 34 to 41, the controller including:

- a) One or more sensors for sensing the target; and,
- b) A processor adapted to:
 - i) Monitor the sensors to thereby determine the position of the target with respect to the missile;
 - ii) Determine a projectile deployment pattern;
 - iii) Select one or more of the projectile systems in accordance with the projectile deployment pattern; and,
 - iv) Activate the selected projectile systems.

15 43) Apparatus according to claim 42, the controller including a store for storing pattern data representing a number of different projectile deployment patterns, the processor being adapted to select one of the stored projectile deployment patterns in accordance with the position of the target.

20 44) Apparatus according to any one of the claims 34 to 43, the vehicle being at least one of a kill vehicle and a missile.

25 45) A missile for intercepting a target, the missile including:

- a) A missile body defining a missile axis; and,
- b) Apparatus according to any one of the claims 34 to 44, the body axis aligned with the missile axis.

30 46) A method of intercepting targets, the method including:

- a) Launching a device at the target, the device including:
 - i) A body; and,

ii) A number of projectile systems mounted to the body in an array, each projectile system being adapted to deploy a number of projectiles in a predetermined direction with respect to the body and, including:

- (1) a barrel
- (2) a number of projectiles
- (3) a number of charges, each charge being adapted to urge a respective projectile along the barrel to thereby deploy the projectile;

5 b) Selectively activating one or more of the charges to thereby deploy projectiles in accordance with a projectile deployment pattern such that at least one of the projectiles intercepts the target.

10 47) A method according to claim 46, the method including:

- a) Determining the position of the target with respect to the device;
- b) Select a projectile deployment pattern in accordance with position of the target; and,
- c) Activating the projectile systems in accordance with the selected projectile deployment pattern.

15 48) A method according to claim 47, each projectile system including:

- a) A barrel defining a barrel axis extending from a breach end to a muzzle end;
- b) A number of projectiles axially stacked along the barrel axis; and,
- c) A number of charges, each charge being associated with a respective projectile, and being adapted to urge the respective projectile along the barrel to thereby deploy the projectile, the method including selectively activating the charges to thereby generate the selected projectile deployment pattern.

20 49) A method according to any one of the claims 46 to 48, the method being performed using at least one of:

- a) A projectile deployment system according to any one of the claims 1 to 28; and,
- b) Apparatus according to any one of the claims 34 to 42.